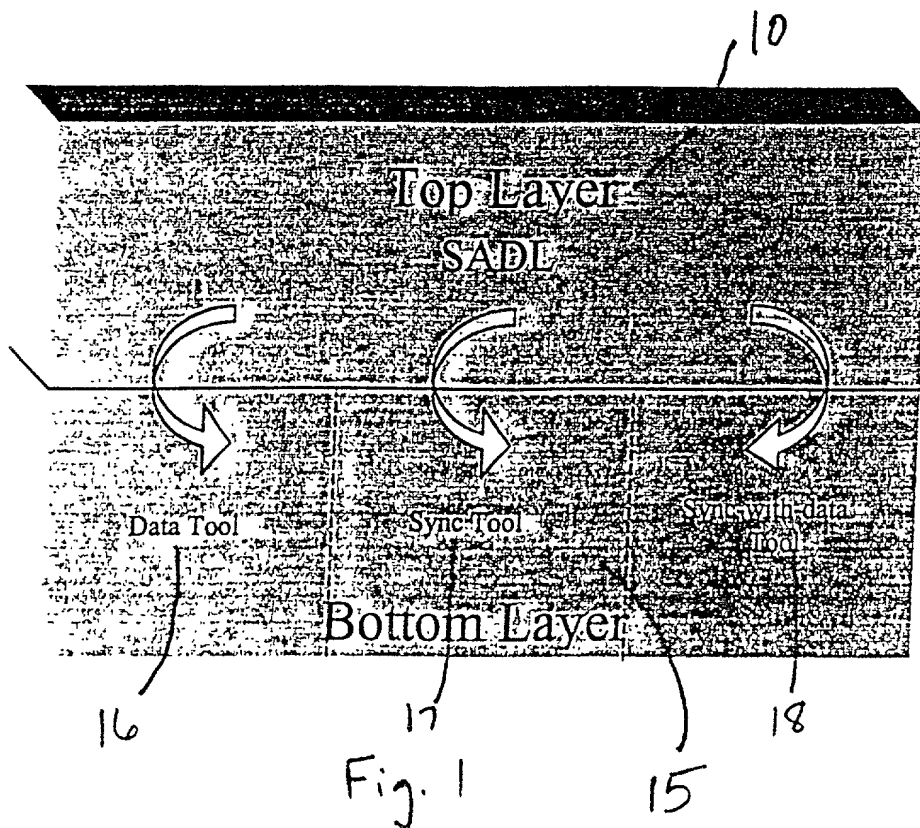


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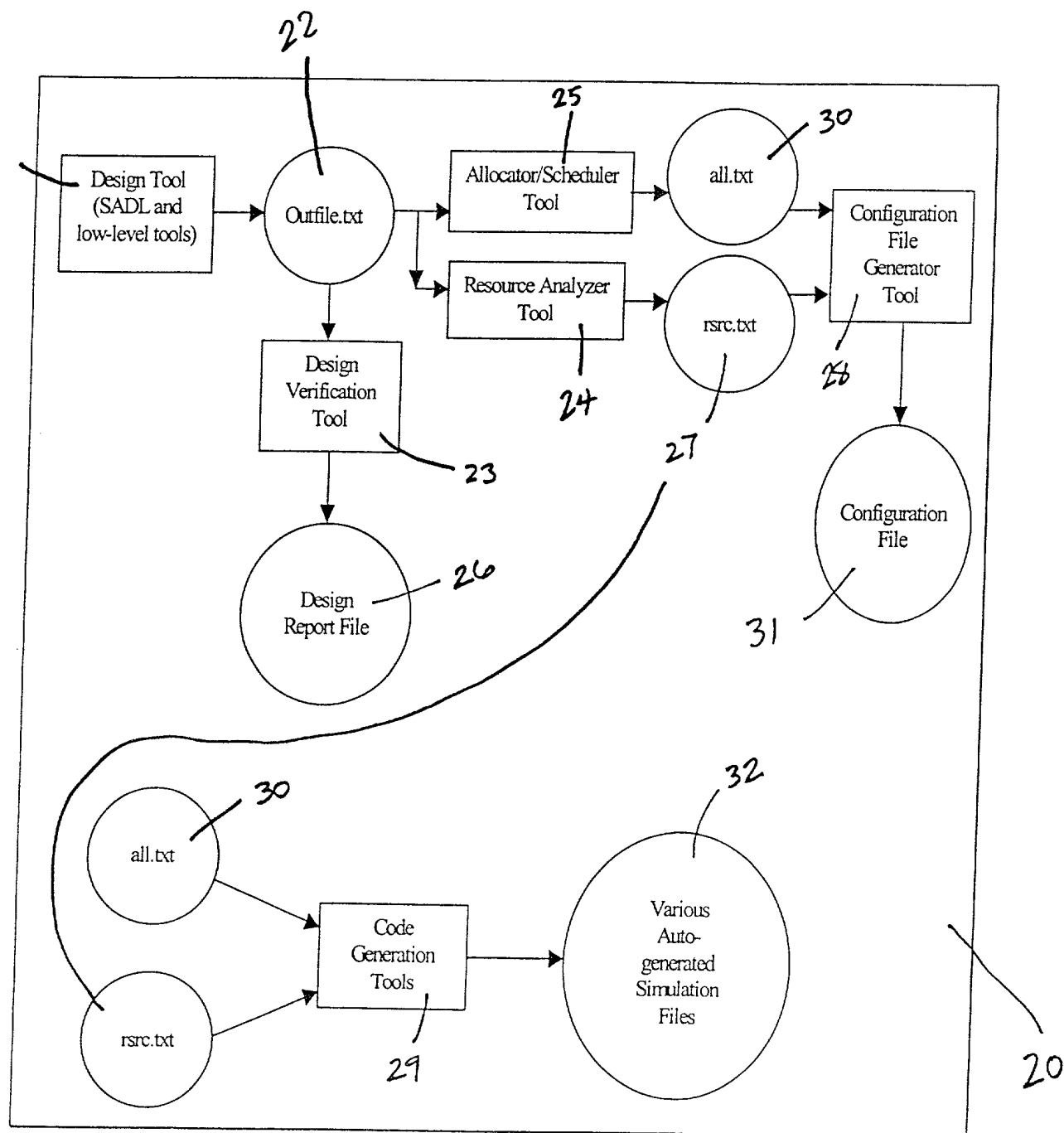


Fig. 2

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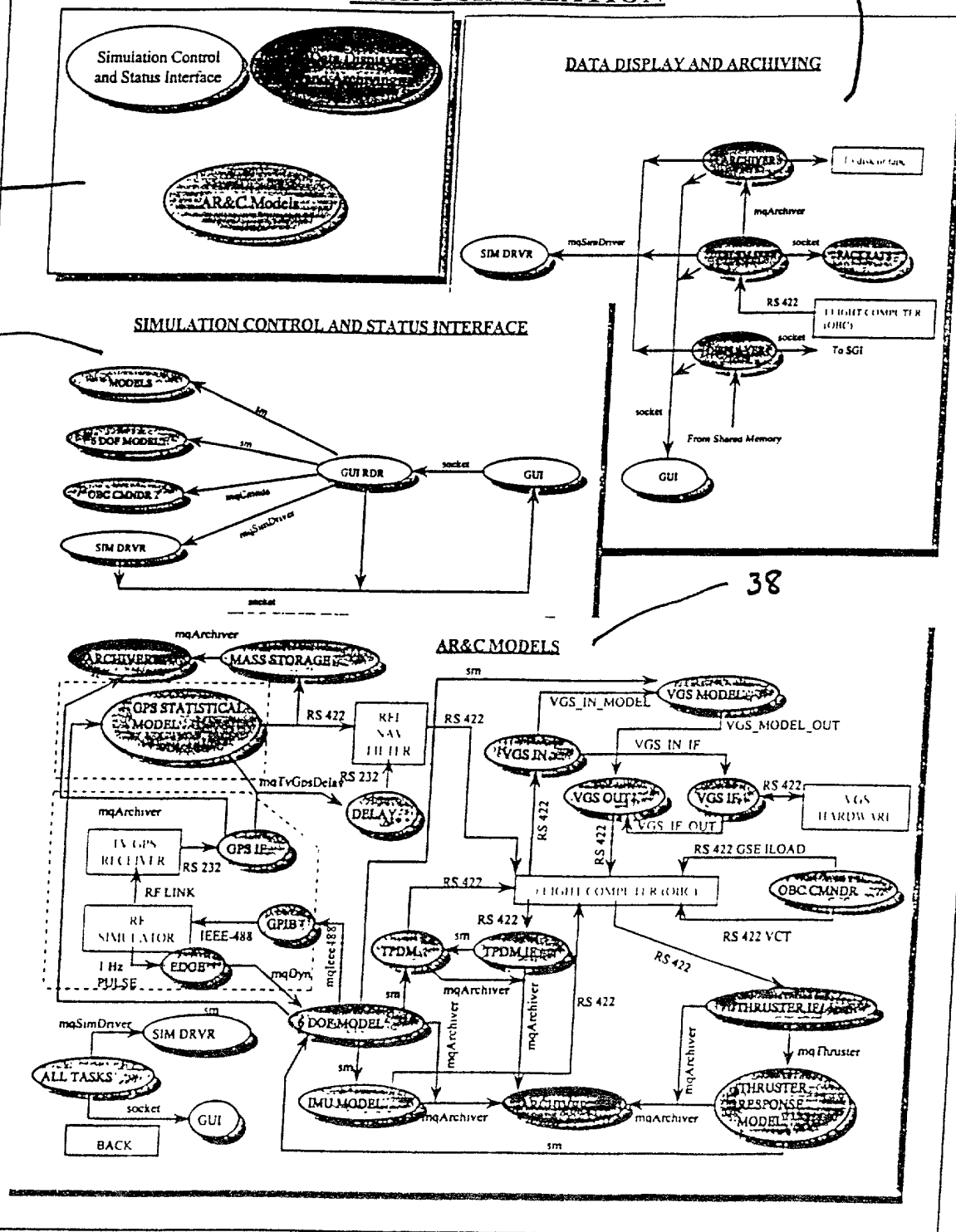


Fig 3. AR&C Simulation architecture.

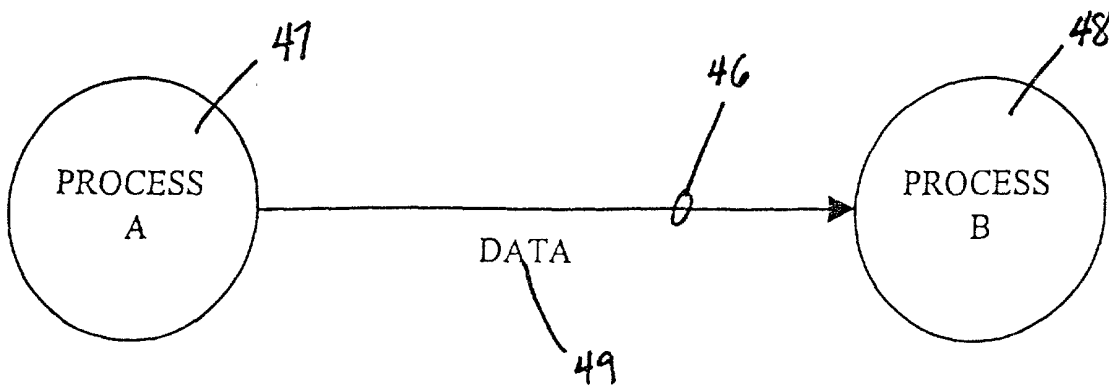
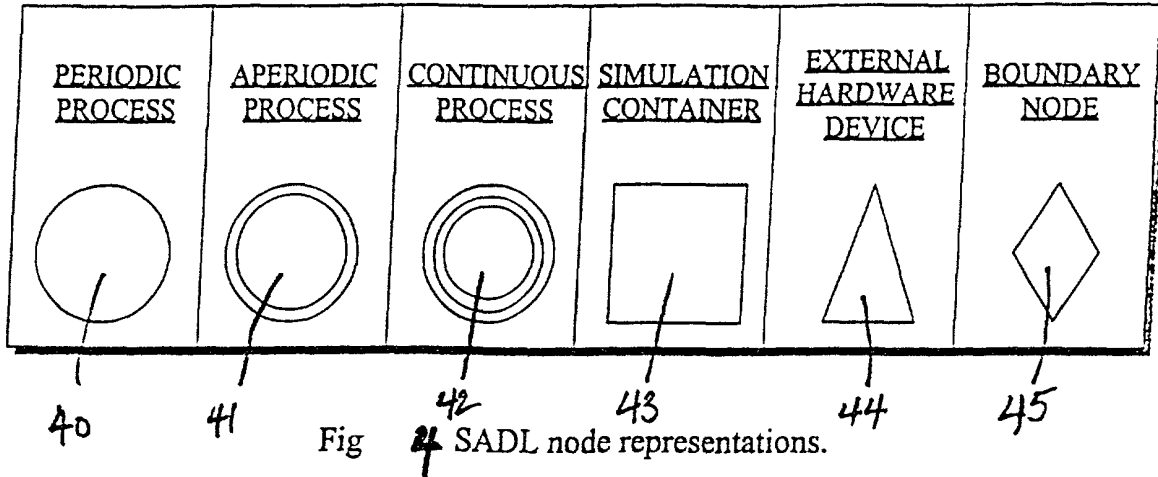


Fig 5 Periodic process A transfers data to periodic process B.

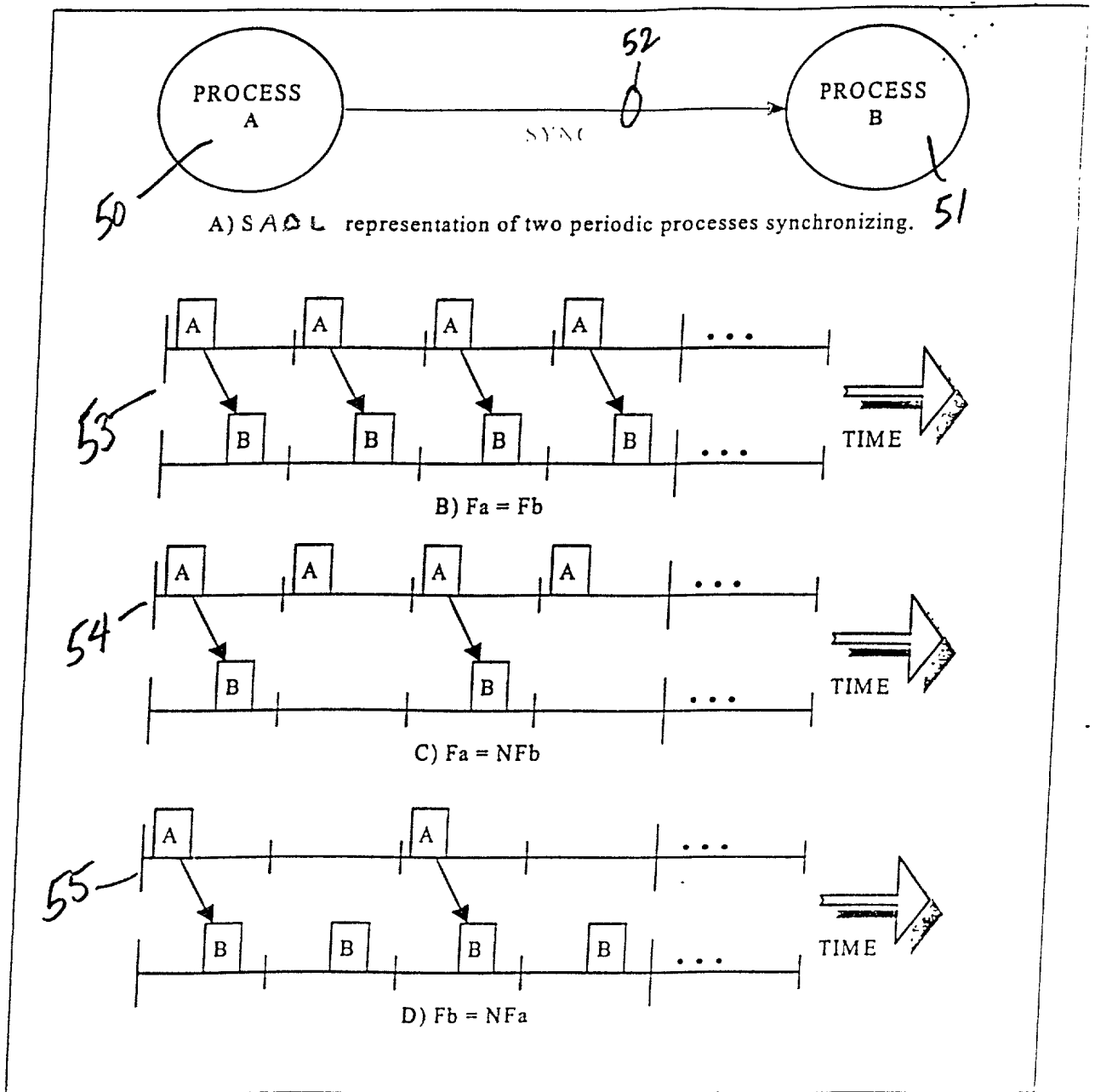


Fig 6. The semantics of two periodic processes synchronizing.

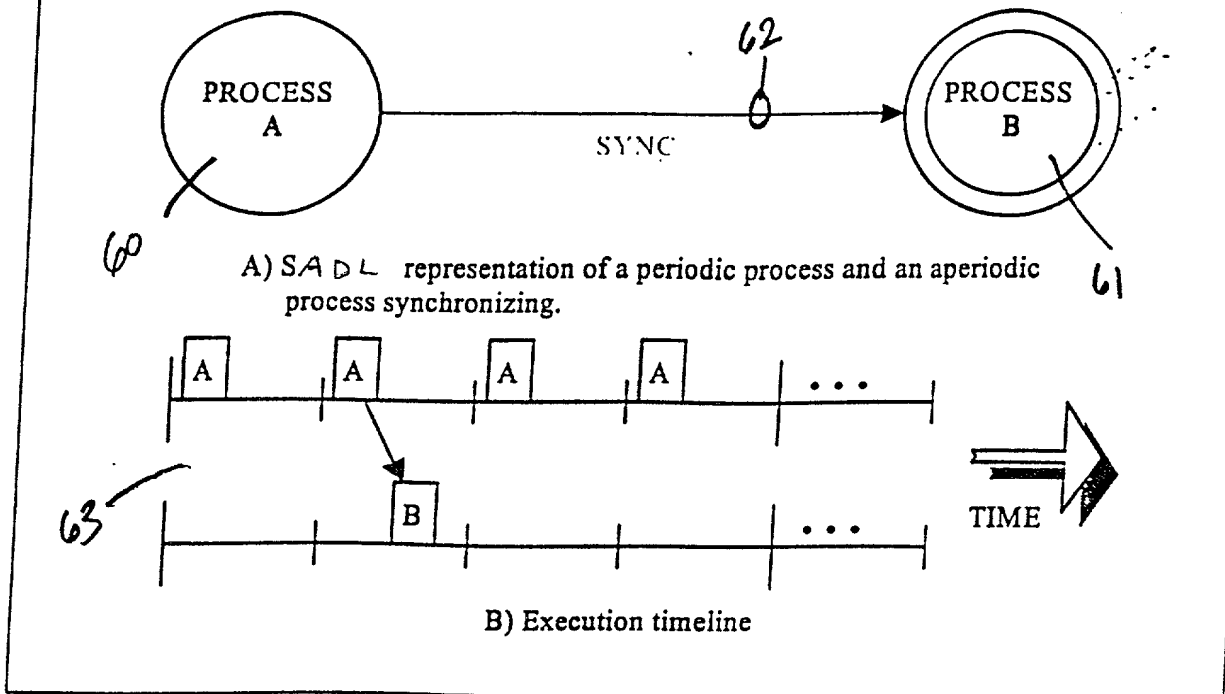


Fig 7. Aperiodic process B requires synchronization from periodic process A.

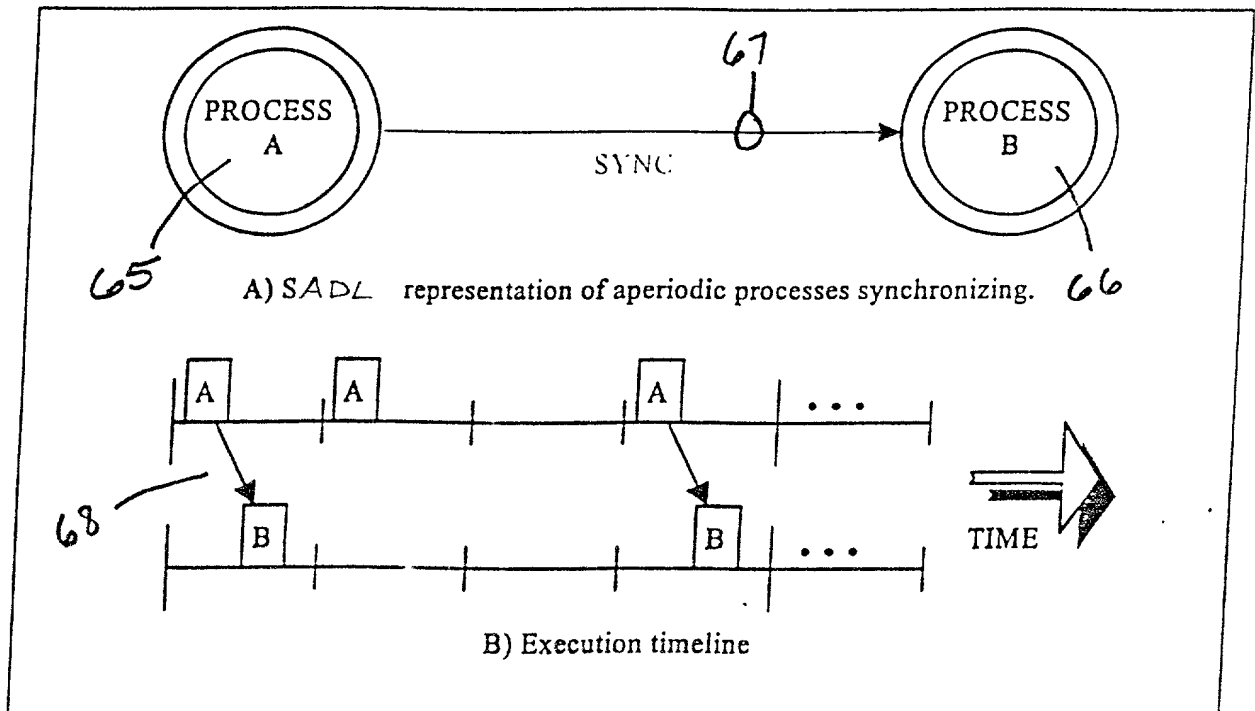


Fig 8. Synchronization between two aperiodic processes.

70

PROCESS A

12

SYNC

PROCESS B

71

A) SADL representation of a continuous process synchronizing with a periodic process.

73

A

B

TIME

B) $F_s = F_b$

74

A

B

TIME

C) $F_b = N F_s$

Fig. 9. A continuous process synchronizing with a periodic process.

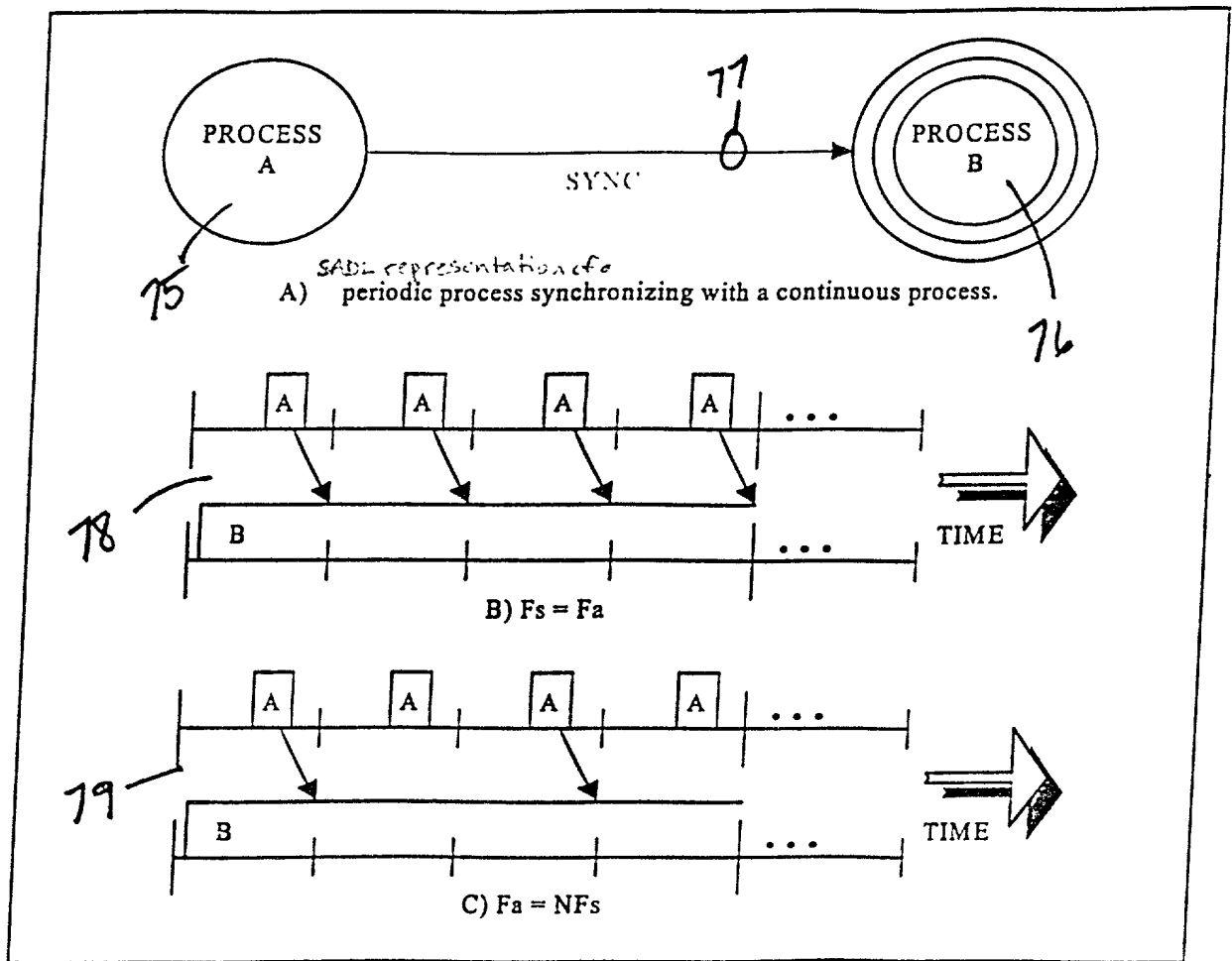


Fig 10 Synchronization from a periodic process to a continuous process.

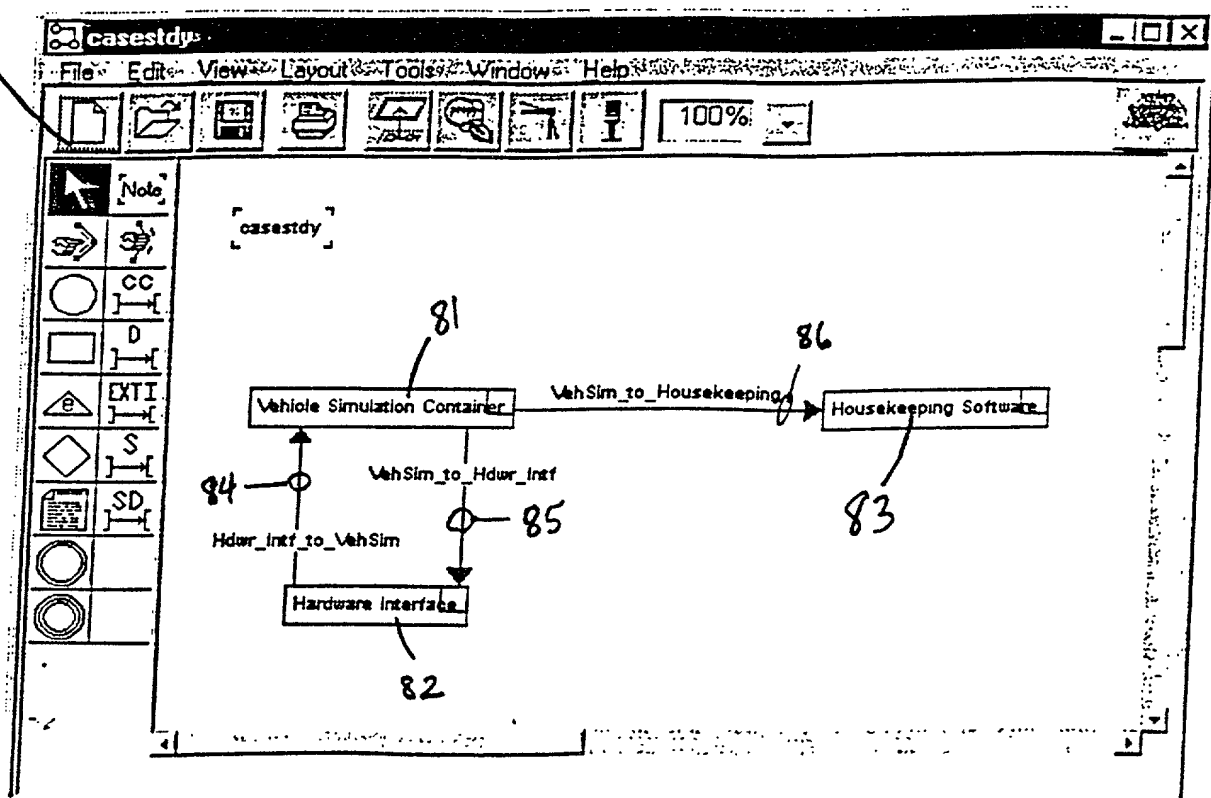


Fig 91 Top-level description of the architecture of the simulation.

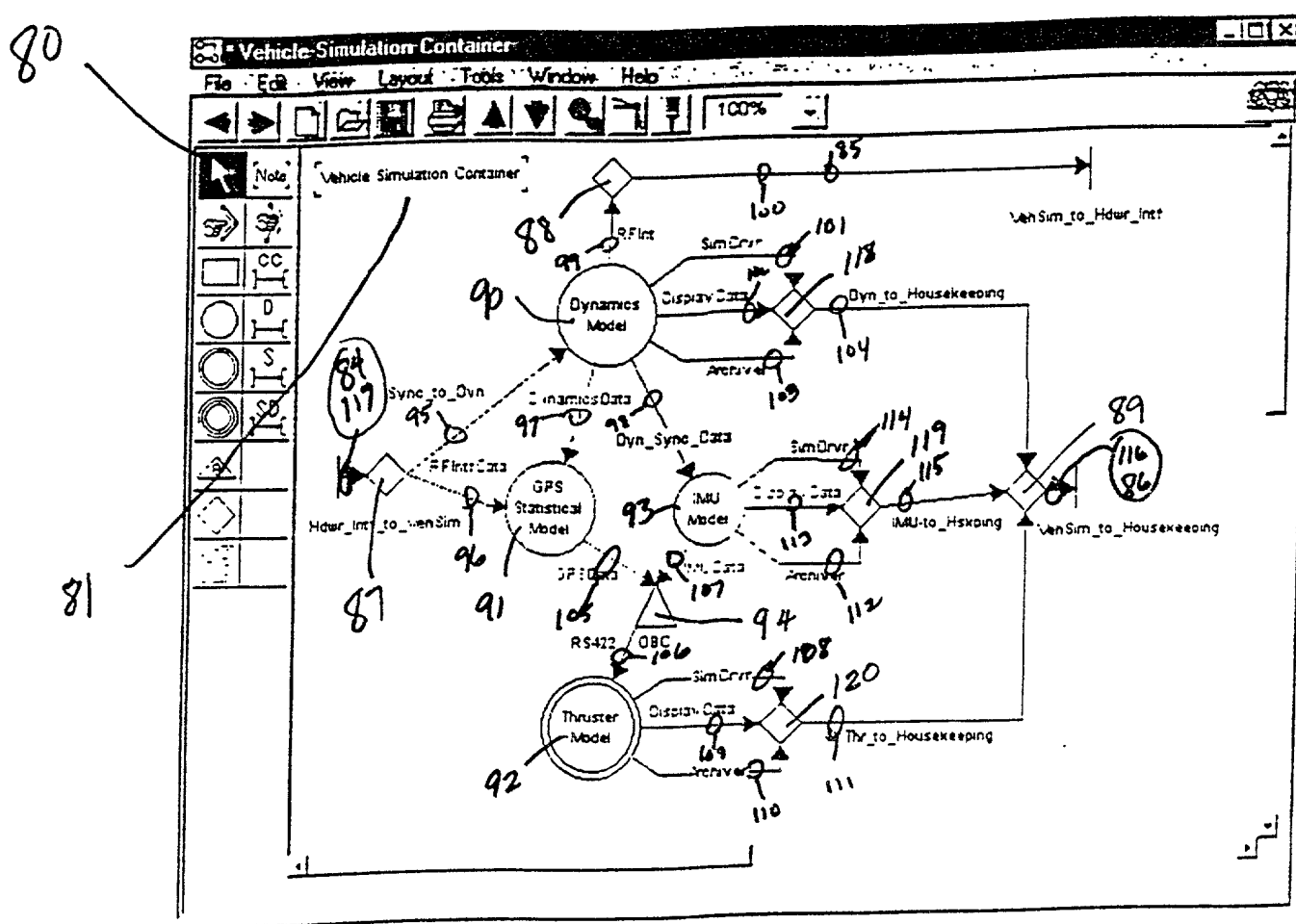


Fig 12 The vehicle simulation portion of the design.

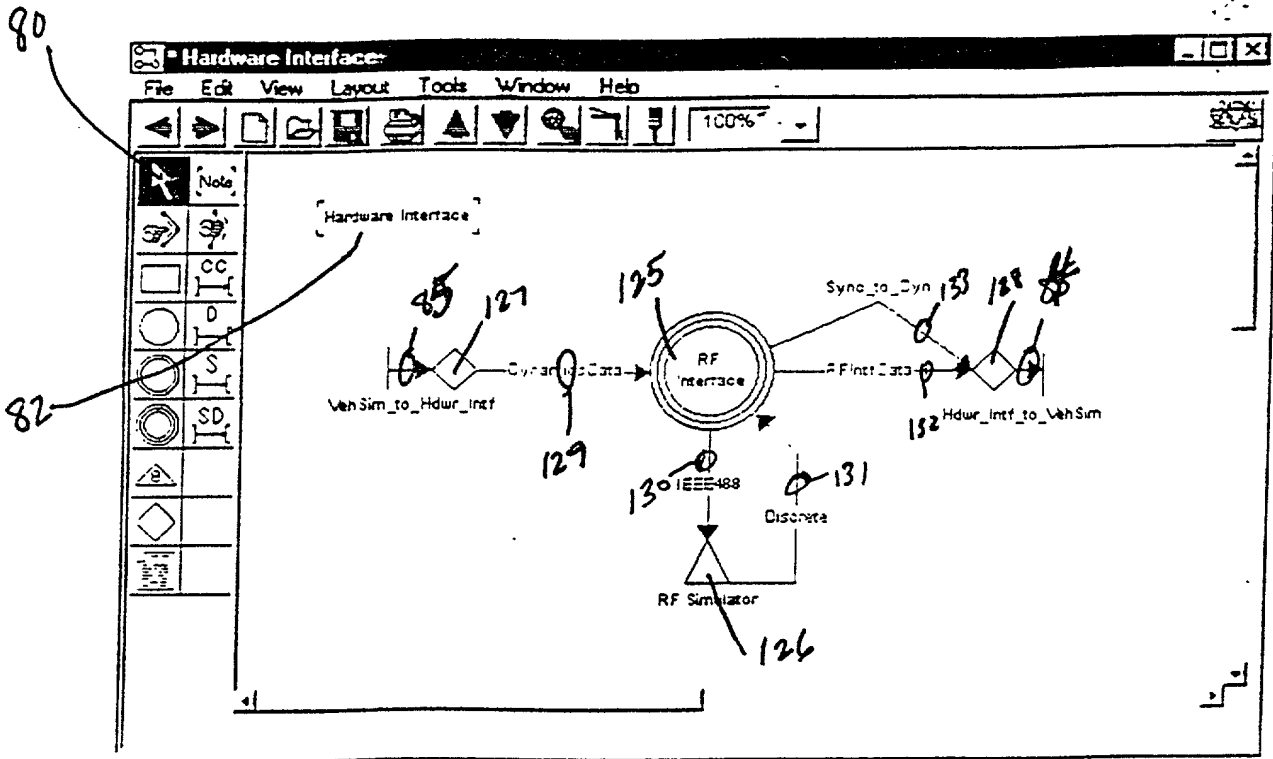


Fig 13 The hardware interface portion of the design.

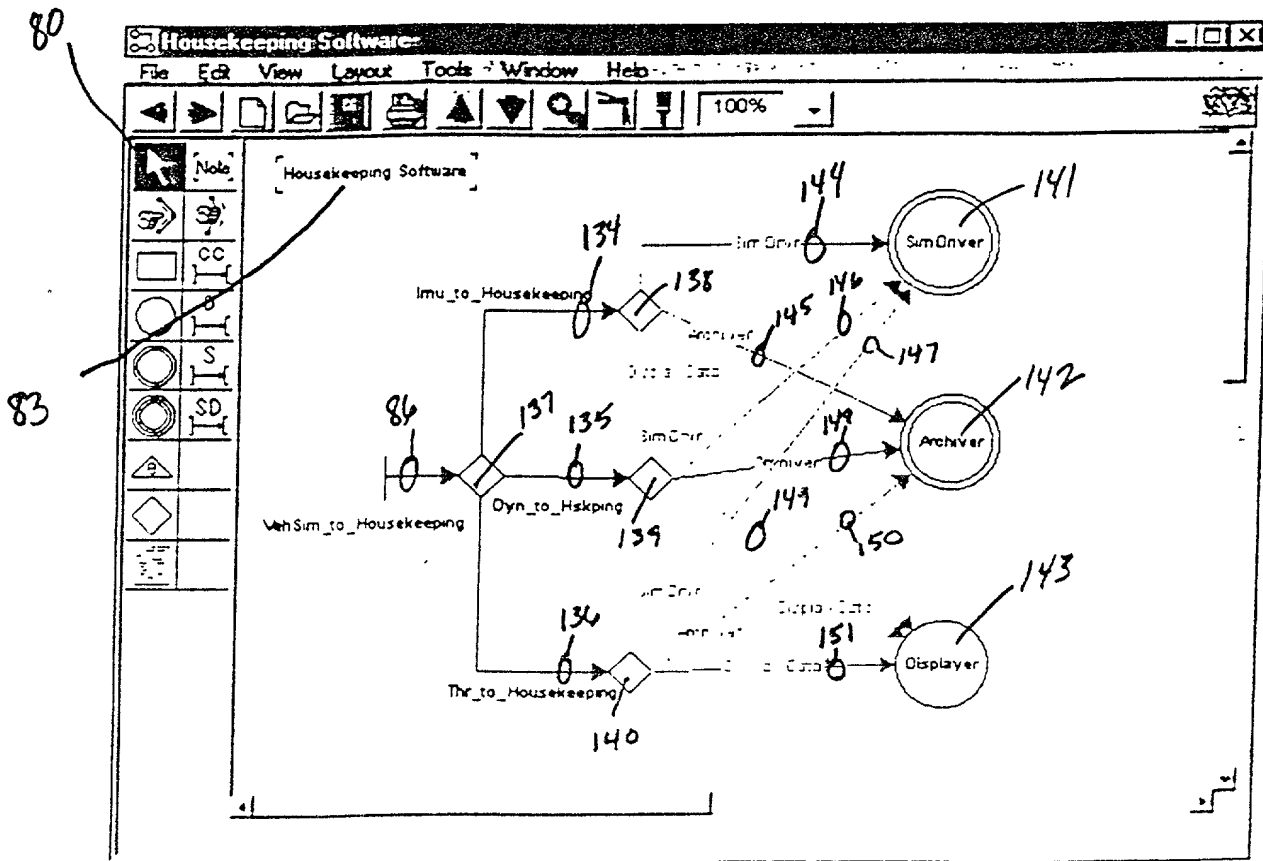


Fig 14 The housekeeping software portion of the design.

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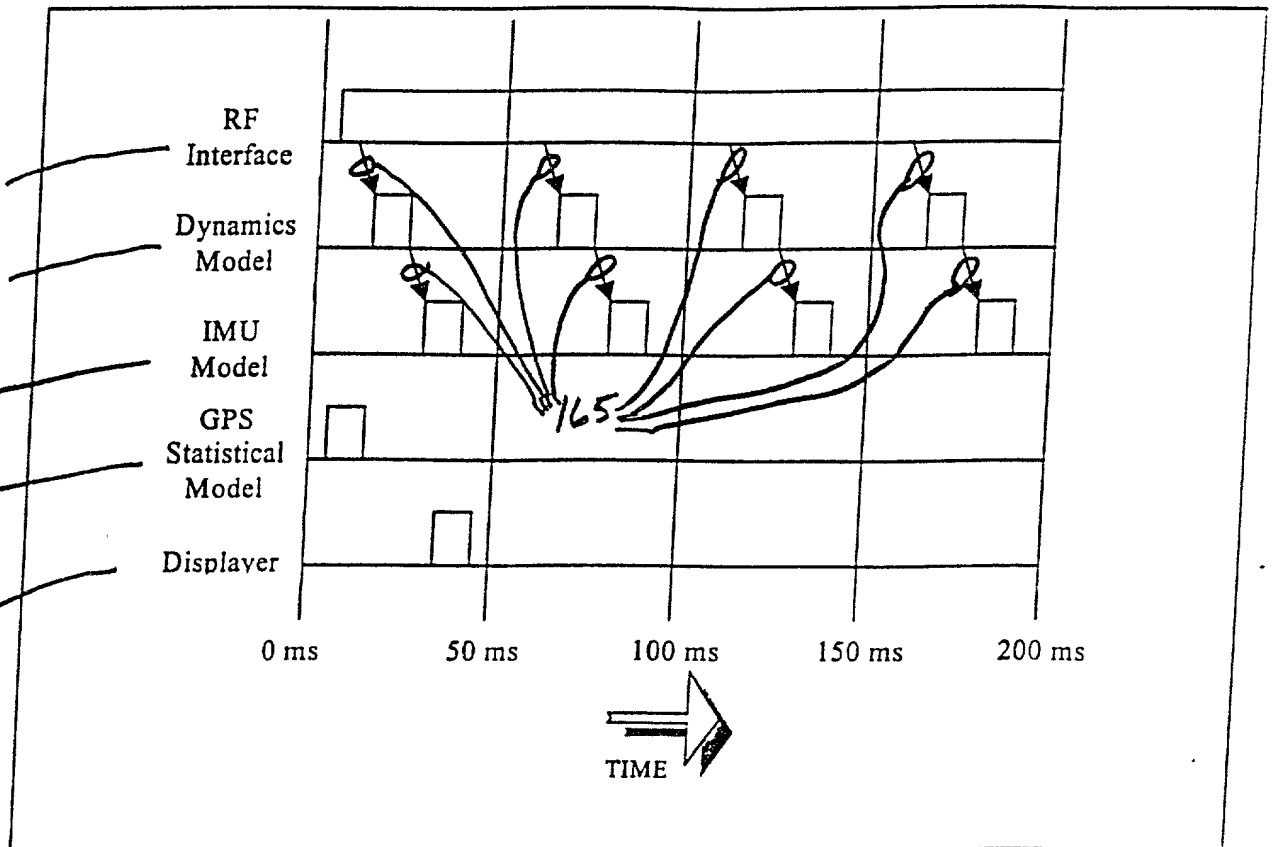


Fig 15. Execution timeline for AR&C simulation.

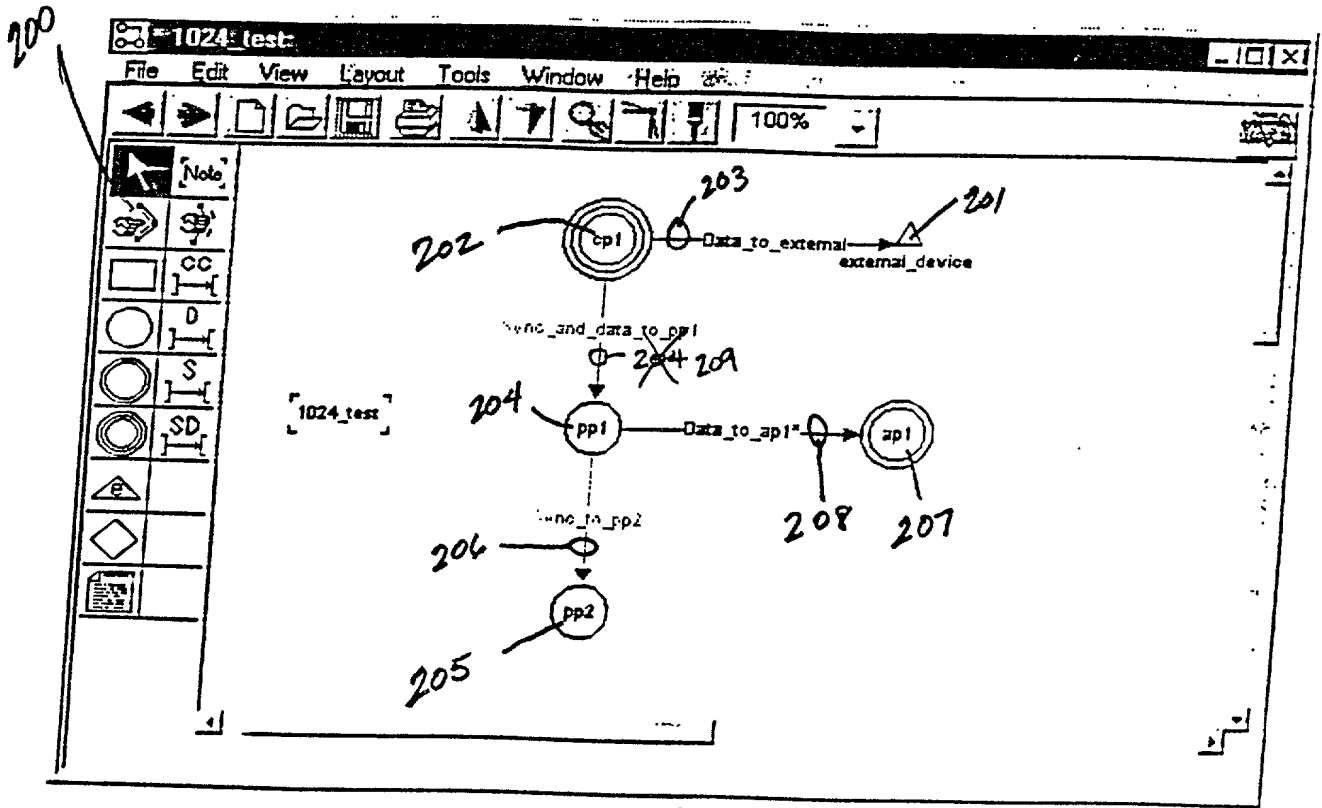


Fig. 16

210

Cont_process

Name: **cp1**

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Priority: ☐ 100

Processor: ☐ 1

Immediate Predecessors: ☒ nil

Command line arguments: ☐

Pathname: ☐ /home/ricks/

Apply

Fig. 17

211

Per-process

File Edit View

Name: pp2

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Command line arguments: ☒

Duration: ☐ 10

FRS Status: ☒ 0 ☐ ☐

Pathname: ☐ /home/ricks/

Frequency: ☐ 50

Deadline: ☐ 10

Processor: ☐ 4

Fig. 18

212

Per-process

File Edit View

Name: pp1

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Command line arguments: ☒

Duration: ☐ 10

FRS Status: ☒ 0 ☐ ☐

Pathname: ☐ /home/ricks/

Frequency: ☐ 20

Deadline: ☐ 10

Processor: ☐ 2

Fig. 19

213

Aper-process

File Edit View

Name: ap1

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Duration: ☐ 5

Command line arguments: ☒

Priority: ☐ 50

Pathname: ☐ /home/ricks/

Deadline: ☐ 20

Processor: ☐ 3

Immediate Predecessors: ☒ nil

Fig. 20

214

SyncData:

File Edit View

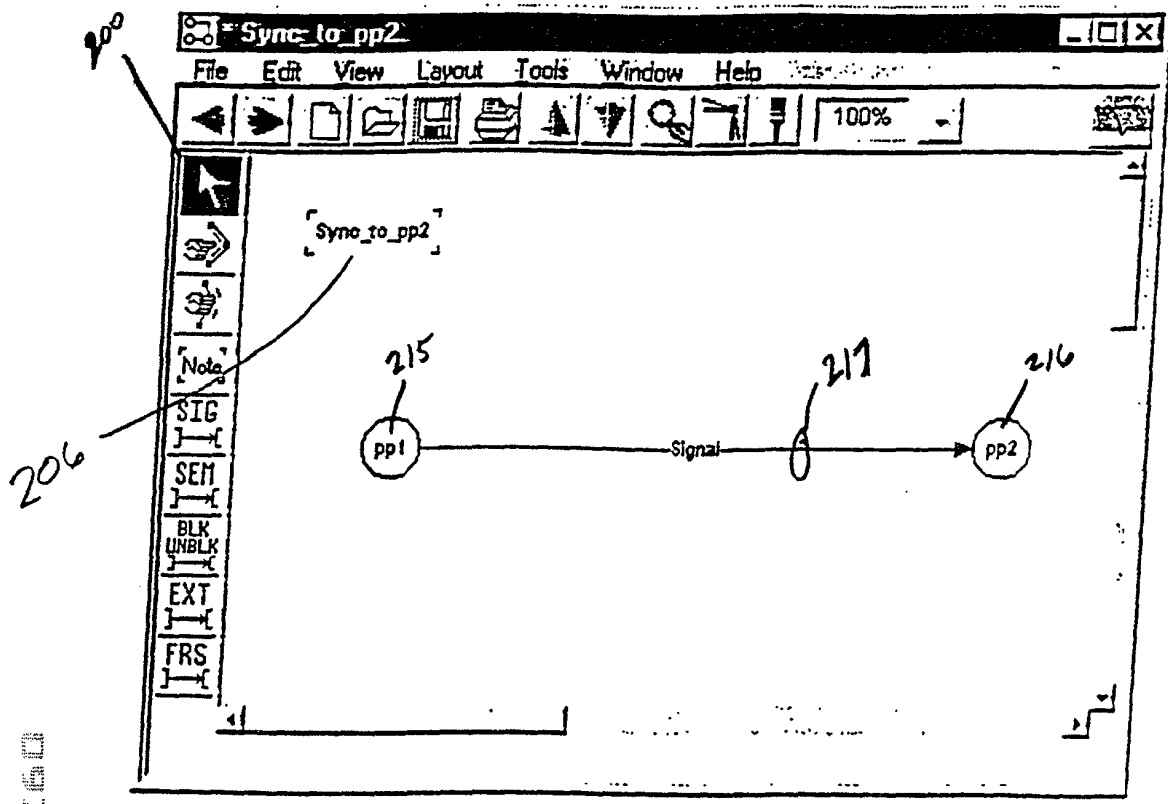
Name: Sync_and_data_to_pp1

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Frequency: ☐ 20

Releasetime: ☒ 0

Fig. 21



208

Sync

File Edit View

Name: Sync_to_pp2

Name	Description	Rationale	Traceability
Color	X-Rets	Overlays	Properties

Frequency: ☐ 20

Release time: ☐ 0

Apply

Fig. 23

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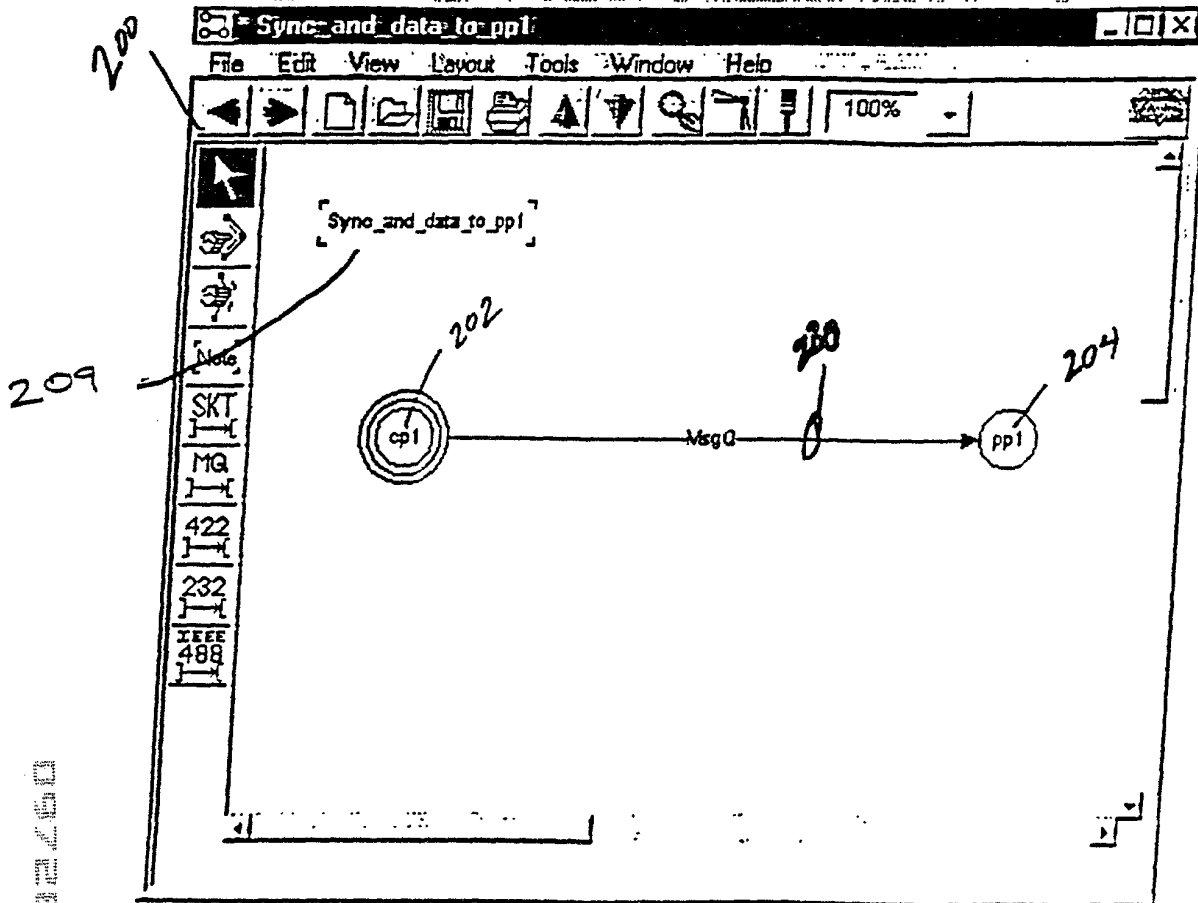


Fig. 24

209

MsgQueue

File Edit View

Name: MsgQ

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Depth: ☒ 1

Data: ☒

nil

Apply

Fig. 25

220

Socket

File Edit View

Name: new Socket

Name	Description	Rationale	Traceability
Color	X-Refs	Overlays	Properties

Data: ☒

nil

PortNumber: ☒ 0

Apply

Fig. 26

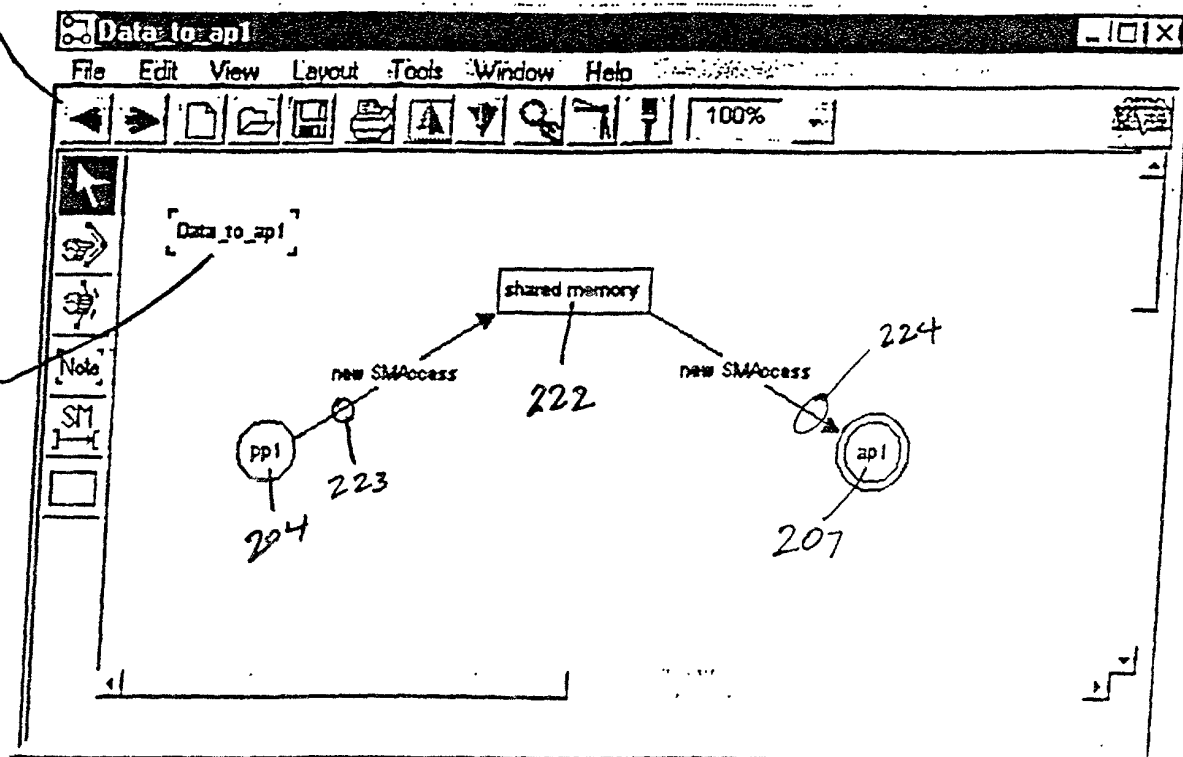


Fig. 27

225

SMAccess

File Edit View

Name: new SMAccess

Name	Description	Rationale	Traceability
Color	X-Rets	Overlays	Properties

Data: ☒

Apply

Fig. 28

226

SharedMem

File Edit View

Name: shared memory

Name	Description	Rationale	Traceability
Color	X-Rets	Overlays	Properties

Data: ☒

Apply

Fig. 29

```

Per_process "pp1"
  Processor 2
  Priority 0
  Commandlineargs ""
  Pathname "/home/ricks/"
  Frequency 20
  Duration 10
  Deadline 10
  Immediate_Predecessors
"ppp2"
  End_Immediate_Predecessors
  FRSSStatus 0
  Incomingarcs
    Sync_and_data_to_pp1
  End_Incomingarcs
  Outgoingarcs
    Data_to_ap1
    Sync_to_pp2
  End_Outgoingarcs
End_Per_process

Per_process "pp2"
  Processor 4
  Priority 0
  Commandlineargs ""
  Pathname "/home/ricks/"
  Frequency 50
  Duration 10
  Deadline 10
  Immediate_Predecessors
"nil"
  End_Immediate_Predecessors
  FRSSStatus 0
  Incomingarcs
    Sync_to_pp2
  End_Incomingarcs
  Outgoingarcs
  End_Outgoingarcs
End_Per_process

Aper_process "ap1"
  Processor 3
  Priority 50
  Commandlineargs ""
  Pathname "/home/ricks/"

```

```

Duration 5
Deadline 20
Immediate_Predecessors
"nil"
End_Immediate_Predecessors
Incomingarcs
    Data_to_ap1
End_Incomingarcs
Outgoingarcs
End_Outgoingarcs
End_Aper_process

Cont_process "cp1"
    Processor 1
    Priority 100
    Commandlineargs ""
    Pathname "/home/ricks/"
    Immediate_Predecessors
"nil"
End_Immediate_Predecessors
Incomingarcs
End_Incomingarcs
Outgoingarcs
    Sync_and_data_to_pp1
    Data_to_external
End_Outgoingarcs
End_Cont_process

External "external_device"
    Incomingarcs
        Data_to_external
    End_Incomingarcs
    Outgoingarcs
    End_Outgoingarcs
End_External

Data "Data_to_ap1"
    Origin "pp1"
    Destination "ap1"
End_Data

SyncData "Sync_and_data_to_pp1"
    Frequency 20
    Releasetime 0
    Origin "cp1"
    Destination "pp1"

```

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End_SyncData

Sync "Sync_to_pp2"
 Frequency 20
 Releasetime 0
 Origin "pp1"
 Destination "pp2"
 End_Sync

Data "Data_to_external"
 Origin "cp1"
 Destination "external_device"
 End_Data

Signal "Signal"
 Origin "pp1"
 Destination "pp2"
 End_Signal

MsgQueue "MsgQ"
 Origin "cp1"
 Destination "pp1"
 Depth 1
 Data
 "nil"
 End_Data
 End_MsgQueue

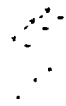
Per_process "pp1"
 Processor 2
 Priority 0
 Commandlineargs ""
 Pathname "/home/ricks/"
 Frequency 20
 Duration 10
 Deadline 10
 Immediate_Predecessors
 "ppp2"
 End_Immediate_Predecessors

```

SMAccess "new SMAccess"
    Origin "ppl"
    Destination "shared memory"
    Data
nil
    End_Data
End_SMAccess

SMAccess "new SMAccess"

```



Origin "shared memory"
 Destination "ap1"
 Data
 nil
 End_Data
 End_SMAccess

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Sheet 24 of 25
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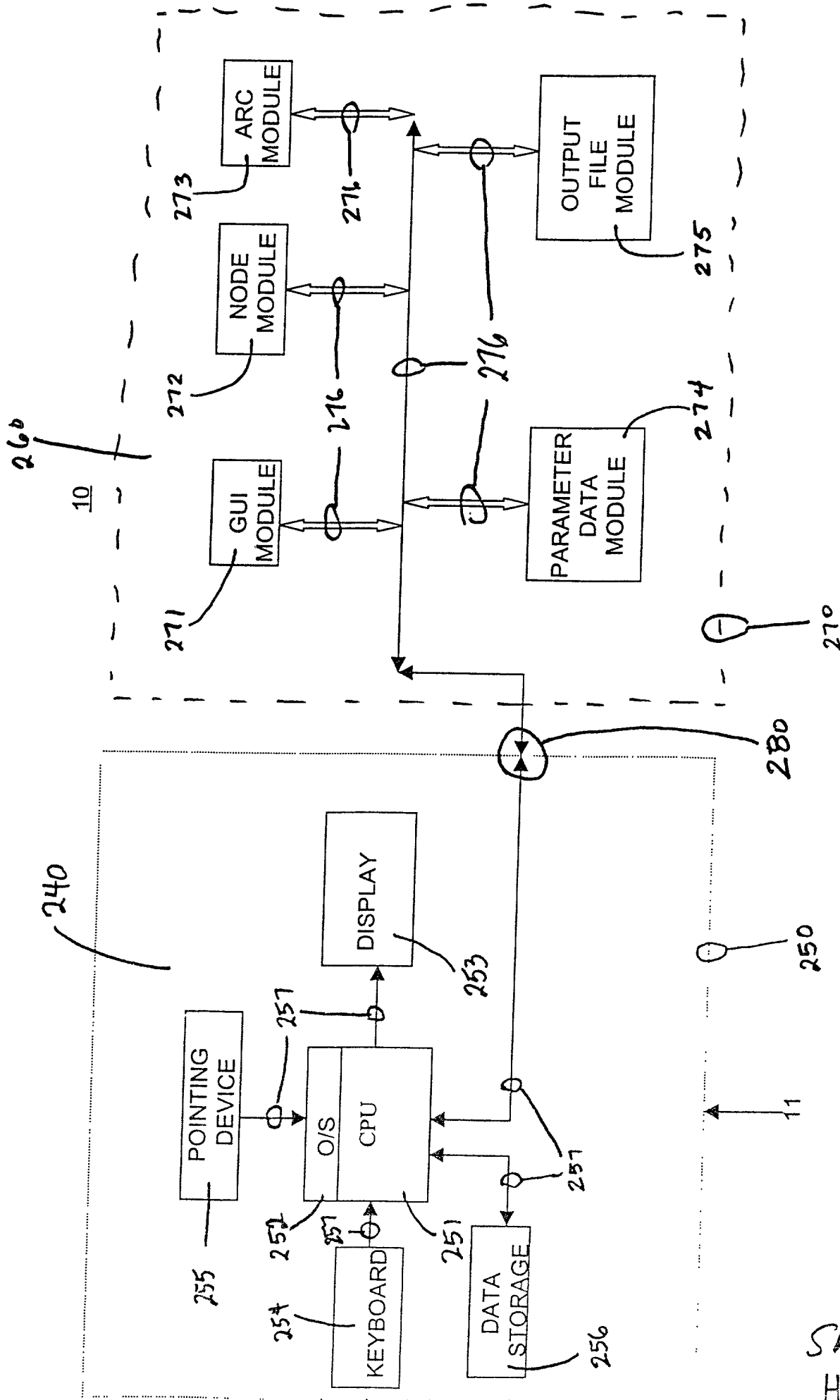


FIG. 31

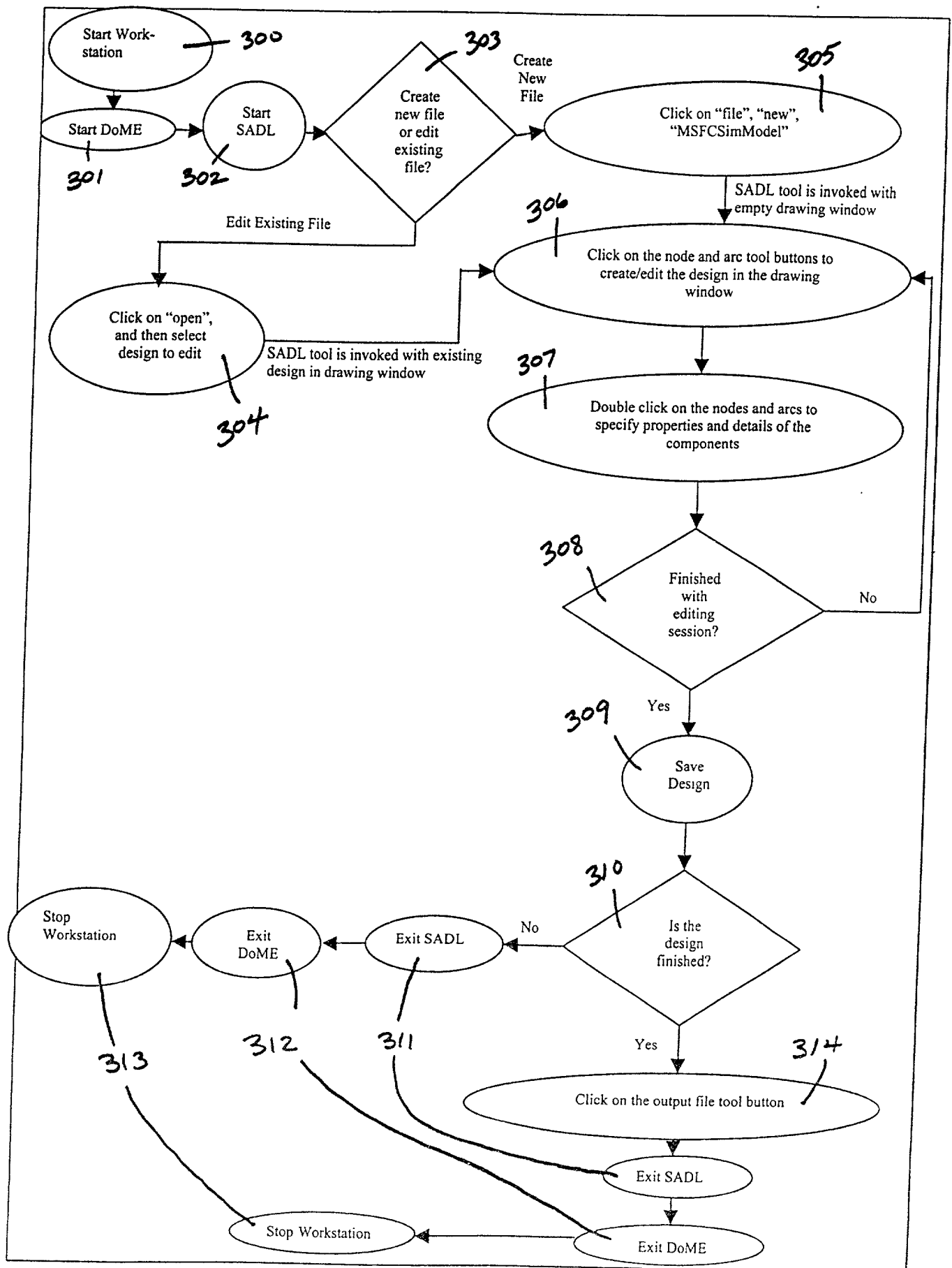


Fig. 32